

Environmental performance								
ESG metrics	GRI STANDARD	List	Unit	2020	2021	2022	2023	
E2.2C	GRI 302-1	Internal energy use						
	(1+2-3)	Total internal energy use/3	mega joule	2,090,437,880.80	2,254,789,189.86	2,153,700,259.81	2,007,170,527.80	
		((non-renewable energy + renewable energy) - total energy)	megawatt-hour	542,517.54	590,341.85	561,357.64	518,742.08	
	(1+2+3)	Total internal energy use	mega joule	2,090,437,880.80	2,254,789,189.86	2,153,700,259.81	2,007,170,527.80	
		(non-renewable energy + renewable energy)	megawatt-hour	542,517.54	590,341.85	561,357.64	518,742.08	
	Ratio	Proportion of renewable energy use to total energy		%	72%	75%	75%	67%
		Proportion of non-renewable energy use to total energy		%	28%	25%	25%	33%
	1	Total internal non-renewable energy use	mega joule	584,663,252.92	567,790,604.79	540,418,868.11	653,380,487.93	
			megawatt-hour	124,246.81	121,731.13	113,223.92	142,689.29	
		Stationary combustion	mega joule	440,799,748.02	431,108,431.59	401,034,136.50	507,567,272.39	
			megawatt-hour	122,444.37	119,752.34	111,398.37	140,990.91	
		- LPG	mega joule	26,620.00	32,535.56	27,359.44	236,770.11	
			kilogram	540.00	660.00	555.00	4,803.00	
		- NGV	mega joule	379,574,117.17	422,393,744.28	400,606,074.62	504,700,334.19	
			cubic feet	372,131,487.42	414,111,514.00	392,751,053.55	494,804,249.20	
		- Fuel oil	mega joule	60,566,488.63	8,075,815.51	0.00	2346231.15	
			liter	1,522,919.00	203,063.00	0.00	58995.00	
		Other fuel (total)	mega joule	632,522.22	606,336.24	400,702.44	283,936.94	
		- Gasoline	liter	0.00	0.00	949.93	0.00	
		- Diesel	liter	17,351.00	16,632.00	10,162.00	7,777.00	
		- Acetylene for construction and maintenance	kilogram	12.00	12.00	14.00	14.00	
		Mobile combustion	mega joule	6,488,751.31	7,123,634.25	6,571,991.43	6,114,187.13	
			megawatt-hour	1,802.43	1,978.79	1,825.55	1,698.39	
		- Fuel oil (total)	mega joule	6,488,751.31	7,123,634.25	6,571,991.43	6,114,187.13	
		- Gasoline	liter	4,237.27	1,079.35	2,223.97	5,558.31	
		- Diesel	liter	174501.98	194663.82	178527.75	163075.55	
		Total purchased electricity and steam used in the prod	mega joule	137,374,753.59	129,558,538.95	132,812,740.17	139,699,028.41	
			megawatt-hour	38,159.65	35,988.48	36,892.43	38,805.29	
	- Total purchased electricity from non-renewable energy	mega joule	137,374,753.59	129,558,538.95	132,812,740.17	139,699,028.41		
		megawatt-hour	38,159.65	35,988.48	36,892.43	38,805.29		
	- Total purchased steam energy from non-renewable ene	mega joule	0.00	0.00	0.00	0.00		
		megawatt-hour	0.00	0.00	0.00	0.00		
		ton	0.00	0.00	0.00	0.00		
E2.3C	2	Total internal renewable energy use	mega joule	1,505,774,627.88	1,686,998,585.07	1,613,281,391.70	1,353,790,039.86	
			megawatt-hour	418,270.73	468,610.72	448,133.72	376,052.79	
		Electricity and steam energy purchase from external renewable energy source	mega joule	539,789,897.58	583,664,084.48	629,495,778.05	425,798,267.13	
			megawatt-hour	149,941.64	162,128.91	174,859.94	118,277.30	
		- Purchased steam energy from renewable energy source	mega joule	439,893,371.58	465,457,619.65	538,430,336.45	333,250,992.39	
			megawatt-hour	122,192.60	129,293.78	149,563.98	92,569.72	
				ton	159,175.19	168,425.60	194,830.74	120,586.70
		- Purchased electricity from solar cell	mega joule	9,560,674.80	8,533,778.83	9,018,828.00	11,776,665.60	
megawatt-hour	2,655.74		2,370.49	2,505.23	3,271.30			

ESG metrics	GRI STANDARD	List	Unit	2020	2021	2022	2023
E2.3C	2	- Purchased electricity from biomass or biogas	mega joule	90,335,851.20	109,672,686.00	82,046,613.60	80,770,609.15
			megawatt-hour	25,093.29	30,464.64	22,790.73	22,436.28
		Total produced electricity and steam energy from renewable energy source	mega joule	965,984,730.30	1,103,334,500.59	983,785,613.65	927,991,772.73
			megawatt-hour	268,329.09	306,481.81	273,273.78	257,775.49
		- Electricity from solar cell	mega joule	0.00	0.00	0.00	0.00
			megawatt-hour	0.00	0.00	0.00	0.00
		- Biogas (electricity/steam production from biogas)	mega joule	396,985,540.89	471,384,336.85	325,544,225.65	343,132,944.09
			megawatt-hour	110,273.76	130,940.09	90,428.95	95,314.71
			cubic feet	18,967,297.70	22,521,946.34	15,553,952.49	16,394,311.71
		- Biomass: chopped wood (electricity/steam production from biomass)	mega joule	551,551,688.61	587,052,158.94	553,393,432.80	568,773,510.24
			megawatt-hour	153,208.80	163,070.04	153,720.40	157,992.64
			kilogram	34,493,539.00	36,713,706.00	34,608,720.00	35,570,576.00
		- Biomass: husk (electricity/steam production from biomass)	mega joule	17,447,500.80	44,898,004.80	104,847,955.20	16,085,318.40
			megawatt-hour	4,846.53	12,471.67	29,124.43	4,468.14
kilogram	1,211,632.00		3,117,917.00	7,281,108.00	1,117,036.00		
	3	Total produced renewable energy distribution (electricity, thermal energy)	mega joule	0.00	0.00	0.00	0.00
			megawatt-hour	0.00	0.00	0.00	0.00
		- Non-renewable energy distribution (electricity/steam)	mega joule	0.00	0.00	0.00	0.00
			megawatt-hour	0.00	0.00	0.00	0.00
		- Renewable energy distribution (electricity/steam)	mega joule	0.00	0.00	0.00	0.00
			megawatt-hour	0.00	0.00	0.00	0.00
E2.5R	GRI302-3	Energy use ratio per product unit					
		Biodiesel and glycerin	megajou/liter	1.73	1.79	1.91	2.00
		Ethanol	megajou/liter	8.85	9.71	11.64	9.14

Remark

1. Water management reporting scope of BBGI Public Company Limited Group 2023 covers company groups as follow:

- 1.1. BBGI Public Company Limited Head Office
- 1.2. BBGI Bioethanol Public Company Limited
- 1.3. BBGI Bioethanol (Chachoengsao) Company Limited
- 1.4. BBGI Biodiesel Company Limited
- 1.5. BBGI Utility and Power Company Limited

2. In 2022, BBGI Public Company Limited Group started to report energy use data within the organization in accordance with GRI 302, version 2016.

Previous data from 2020 - 2023 has been reclassified to report in accordance with GRI 302, version 2016. Data from 2020 - 2022 that do not have a

3. Thermal energy calculation is calculated from the fuel amount multiplied by the conversion factor according to the Department of Alternative Energy

4. Calculate the energy value of biomass fuel (chopped wood and rice husk) from the wet weight of the fuel multiplied by the net calorific value. This is

5. Calculated from every business's total energy use difference and electrical power and steam distribution.

ESG metrics	GRI STANDARD	List	Unit	2020	2021	2022	2023
		Total water withdrawal (1 megaliter = 1,000 cubic meters)					
		Total water withdrawal by source					
		Total water withdrawal	megaliter	3,034.81	3,129.60	2,562.73	2,705.72
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	3,034.81	3,129.60	2,562.73	2,705.72
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Surface water	megaliter	2,564.00	2,562.90	1,994.43	2,047.98
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	2,564.00	2,562.90	1,994.43	2,047.98
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Groundwater	megaliter	470.69	566.62	568.17	657.60
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	470.69	566.62	568.17	657.60
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Water from other processes	megaliter	0.000	0.000	0.000	0.000
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Water from other agencies (tap water)	megaliter	0.112	0.077	0.121	0.138
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	0.112	0.077	0.121	0.138
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		Total water resource withdrawal in water stress	megaliter	1,351.81	1,496.14	1,428.46	1,609.40
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	1,351.81	1,496.14	1,428.46	1,609.40
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Surface water	megaliter	881.12	929.52	860.28	951.80
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	881.12	929.52	860.28	951.80
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Groundwater	megaliter	470.69	566.62	568.17	657.60
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	470.69	566.62	568.17	657.60
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Water from other processes	megaliter	0.000	0.000	0.000	0.000
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Water from other agencies (tap water)	megaliter	0.000	0.000	0.000	0.000
		- Total water with the suspended or dissolved solid amount less than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		- Total other water with the suspended or dissolved solid amount more than 1,000 mg/liter.	megaliter	0.000	0.000	0.000	0.000
		Wastewater					
		Total wastewater in every area	megaliter	112.40	77.40	120.80	138.30
		Total wastewater from factory	megaliter	0.00	0.00	0.00	0.00
		- Surface water source	megaliter	0.00	0.00	0.00	0.00
		- Groundwater source	megaliter	0.00	0.00	0.00	0.00
	GRI303-3						
	GRI303-4						

ESG metrics	GRI STANDARD	List	Unit	2020	2021	2022	2023		
	GRI303-4	- External source (Send to external wastewater treatment)	megaliter	0.00	0.00	0.00	0.00		
		-Total water released (with the suspended or dissolved solid amount less than 1,000 mg/liter)	megaliter	0.00	0.00	0.00	0.00		
		-Total other water released (with the suspended or dissolved solid amount more than 1,000 mg/liter)	megaliter	0.00	0.00	0.00	0.00		
		Total water released from M-Tower (BBGI-HQ)	megaliter	112.40	77.40	120.80	138.30		
		- Surface water source	megaliter	0.00	0.00	0.00	0.00		
		- Groundwater source	megaliter	0.00	0.00	0.00	0.00		
		- External source (Send to external wastewater treatment)	megaliter	112.40	77.40	120.80	138.30		
		E3.5R		- Percentage of treated wastewater before releasing	megaliter	100%	100%	100%	100%
			GRI303-4	- Total water released (with the suspended or dissolved solid amount less than 1,000 mg/liter)	megaliter	112.40	77.40	120.80	138.30
				- Total other water released (with the suspended or dissolved solid amount more than 1,000 mg/liter)	megaliter	0.00	0.00	0.00	0.00
Total wastewater in water stress area (water stress areas)	megaliter			0.00	0.00	0.00	0.00		
- Total water released (with the suspended or dissolved solid amount less than 1,000 mg/liter)	megaliter			0.00	0.00	0.00	0.00		
- Total other water released (with the suspended or dissolved solid amount more than 1,000 mg/liter)	megaliter			0.00	0.00	0.00	0.00		
E3.2C	GRI303-5			Total water consumption (total water consumption - total water released in every area)					
- Total water consumption		megaliter	2,922.41	3,052.20	2,441.93	2,567.42			
- Total water consumption in water stress area		megaliter	1,351.81	1,496.14	1,428.46	1,609.40			
E3.4R	-	Water consumption ratio per product unit (per million liters)							
		Biodiesel	megaliter/ megaliter	1.04	1.08	1.14	1.15		
		Glycerin	megaliter/ megaliter		4.06	3.80	2.97		
		Ethanol	megaliter/ megaliter	14.91	15.59	15.71	16.09		

Remark

1. Water management reporting scope of BBGI Public Company Limited Group 2023 covers company groups as follow:

- 1.1. BBGI Public Company Limited Head Office
- 1.2. BBGI Bioethanol Public Company Limited
- 1.3. BBGI Bioethanol (Chachoengsao) Company Limited
- 1.4. BBGI Biodiesel Company Limited
- 1.5. BBGI Utility and Power Company Limited

2. In 2022, BBGI Public Company Limited Group started to report water and wastewater data in accordance with GRI 303, version 2018. Previous data from 2020 - 2023

3. Total surface water and groundwater withdrawal is collected from water meter reading.

4. Total water withdrawal from third party is collected from waterworks invoice.

ESG metrics	GRI STANDARD	List	Unit	2020	2021	2022	2023	
	GRI305-1	Direct greenhouse gas emission from the production process (scope 1)				base year		
		Direct greenhouse gas emission from the production	tCO2e	42,962	46,329	60,777	52,499	
		- Carbon dioxide (CO2)	tCO2e	26,824	24,993	23,060	29,931	
		- Methane (CH4)	tCO2e	15,710	20,854	37,019	21,009	
		- Nitrous oxide (N2 O)	tCO2e	379	424	457	453	
	รายงานแยก	- HFCs leakage	tCO2e	50	57	241	1,106	
		- Carbon dioxide from biogenic (Biogenic CO2)	tCO2e	165,031	179,956	185,222	190,891	
		- Other Biogenic	tCO2e	0	0	0	0	
	GRI305-2	- R22 leakage	tCO2e	171	42	76	113	
		Indirect greenhouse gas emission from electricity, steam, and biogas purchase (scope 2)						
		Indirect greenhouse gas emission from electricity,	tCO2e	20,079	18,446	20,068	20,741	
		- Carbon dioxide (CO2)	tCO2e	20,079	18,446	20,068	20,741	
		- Methane (CH4)	tCO2e	0	0	0	0	
		- Nitrous oxide (N2 O)	tCO2e	0	0	0	0	
	E5.2C	- Carbon dioxide from biogenic (Biogenic CO2)	tCO2e	0	0	0	0	
- Other Biogenic		tCO2e	0	0	0	0		
Total greenhouse gas emission (scope 1+2)								
		tCO2e	63,041	64,775	80,845	73,240		
	GRI305-3	Other related indirect greenhouse gas emission (scope 3)						
		Other related indirect greenhouse gas emission (scope	tCO2e	N/A	N/A	263,433	330,349	
		Upstream	tCO2e	N/A	N/A	259,831	324,265	
		- Product and service purchase (raw material production)	tCO2e	N/A	N/A	240,231	303,989	
		- Upstream product transportation and distribution (raw material transportation)	tCO2e	N/A	N/A	13,109	17,304	
		- Tap water consumption	tCO2e	N/A	N/A	0	-	
		- Waste transportation	tCO2e	N/A	N/A	6,491	2,973	
		- Business travel	tCO2e	N/A	N/A	-	-	
		- Employee's commuting between home and workplace	tCO2e	N/A	N/A	-	-	
		Downstream	tCO2e	N/A	N/A	3,601	6,083	
		- Downstream product transportation and distribution (product transportation)	tCO2e	N/A	N/A	3,601	4,990	
E5.5R	Total greenhouse gas emission (scope 1+2+3)							
		tCO2e	N/A	N/A	344,277	403,588		
		Separate greenhouse gas emission by establishment						
		Total direct greenhouse gas emission from the production process (scope 1)	tCO2e	42,962	46,329	52,133	47,389	
		Total direct greenhouse gas emission from the production process (scope 2)	tCO2e	20,079	18,446	20,014	20,750	
		Total other related indirect greenhouse gas emission (scope 3)	tCO2e	N/A	N/A	263,433	329,272	
		BBGI Public Company Limited Head Office						
		Total direct greenhouse gas emission from the production process (scope 1)	tCO2e	N/A	N/A	8	11	
		Total direct greenhouse gas emission from the production process (scope 2)	tCO2e	N/A	N/A	48	49	
		Total other related indirect greenhouse gas emission (scope 3)	tCO2e	N/A	N/A	1	2	

ESG metrics	GRI STANDARD	List	Unit	2020	2021	2022	2023
		BBGI Biodiesel Company Limited				base year	
		Total direct greenhouse gas emission from the production process (scope 1)	tCO ₂ e	22,053	25,222	26,734	32,850
		Total direct greenhouse gas emission from the production process (scope 2)	tCO ₂ e	7,947	8,581	8,046	9,282
		Total other related indirect greenhouse gas emission (scope 3)	tCO ₂ e	N/A	N/A	208,294	284,538
		BBGI Bioethanol (Chachoengsao) Company Limited					
		Total direct greenhouse gas emission from the production process (scope 1)	tCO ₂ e	963	1,100	1,198	1,155
		Total direct greenhouse gas emission from the production process (scope 2)	tCO ₂ e	7,920	8,680	9,244	8,852
		Total other related indirect greenhouse gas emission (scope 3)	tCO ₂ e	N/A	N/A	13,704	8,612
		BBGI Bioethanol Public Company Limited (Bo Ploi)					
		Total direct greenhouse gas emission from the production process (scope 1)	tCO ₂ e	19,432	19,519	148	141
		Total direct greenhouse gas emission from the production process (scope 2)	tCO ₂ e	3,560	733	1,153	787
		Total other related indirect greenhouse gas emission (scope 3)	tCO ₂ e	N/A	N/A	33,736	31,069
		BBGI Bioethanol Public Company Limited (Nam Phong)					
		Total direct greenhouse gas emission from the production process (scope 1)	tCO ₂ e	514	488	24,053	13,243
		Total direct greenhouse gas emission from the production process (scope 2)	tCO ₂ e	652	452	1,571	1,770
		Total other related indirect greenhouse gas emission (scope 3)	tCO ₂ e	N/A	N/A	7,678	5,027
		BBGI Utility and Power Company Limited (Bo Ploi)					
		Total direct greenhouse gas emission from the production process (scope 1)	tCO ₂ e	-	-	8,637	4,904
		Total direct greenhouse gas emission from the production process (scope 2)	tCO ₂ e	-	-	5	9
		Total other related indirect greenhouse gas emission (scope 3)	tCO ₂ e	-	-	20	24
		BBGI Utility and Power Company Limited (Nam Phong)					
		Total direct greenhouse gas emission from the production process (scope 1)	tCO ₂ e	-	-	-	194
		Total direct greenhouse gas emission from the production process (scope 2)	tCO ₂ e	-	-	-	-
		Total other related indirect greenhouse gas emission (scope 3)	tCO ₂ e	-	-	-	7
		Greenhouse gas emission ratio per product unit (Intensity)					
E5.6R	GRI305-4	BBGI Biodiesel Company Limited	tCO ₂ e/mil. Litre	116	135	158	145
		BBGI Bioethanol (Chachoengsao) Company Limited	tCO ₂ e/mil. Litre	192	202	228	208
		BBGI Bioethanol Public Company Limited (Bo Ploi)	tCO ₂ e/mil. Litre	258	220	24	18
		BBGI Bioethanol Public Company Limited (Nam Phong)	tCO ₂ e/mil. Litre	23	23	562	344
		BBGI Utility and Power Company Limited (Bo Ploi)	tCO ₂ e/mil. Nm ³	-	-	1,289	739
		BBGI Utility and Power Company Limited (Nam Phong)	tCO ₂ e/mil. Nm ³	-	-	-	38

Note

1. Greenhouse gas account reporting scope of BBGI Public Company Limited Group 2023 covers company groups as follow:

- 1.1. BBGI Public Company Limited Head Office
- 1.2. BBGI Bioethanol Public Company Limited
- 1.3. BBGI Bioethanol (Chachoengsao) Company Limited
- 1.4. BBGI Biodiesel Company Limited
- 1.5. BBGI Utility and Power Company Limited (*began operating in 2022)

2. In 2022, BBGI Public Company Limited Group started to disclose greenhouse gas emission report according to GRI Universal Standards: GRI 305, version 2016 such as GRI305-1 GRI305-2 and GRI305-3. Previous data from 2019 - 2022 has been reclassified to report in accordance with GRI 305, version 2016. Data from 2019 - 2022 that do not have a database according to the new criteria will be replaced with N/A.

3. Greenhouse gas report, scope 1 and 2, calculated from the Company's calculation tool, which uses IPCC 2006 calculation principle.

4. Greenhouse gas emission scope 1 calculation uses emission factors from IPCC 2006 and the API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry 2009

5. Greenhouse gas emission scope 2 calculation uses emission factors of electricity consumption from the Energy Policy and Planning Office, Ministry of Energy.

6. Greenhouse gas emission scope 3 calculation uses emission factors according to TGO's database, with reference to Thai National LCI Database, TIIS-MTEC-NSTDA.

7. Greenhouse gas emission reporting scope 3 in 2022 reports 3 categories based on the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard, i.e.

Category 1: Purchased goods – raw materials

Category 4:Transportation of raw materials

Category 9:Transportation of products and waste

Category 9:Transportation of products and waste

8. Fuel to energy conversion uses calorific value from the Department of Alternative Energy Development and Efficiency.

9. Since 2022 Global Warming Potentials (GWP) uses IPCC Fifth Assessment Report (AR5) values from the Greenhouse Gas Protocol.

10. Gases included in the calculation are CO₂, CH₄, N₂O.

11. GHG Intensity is calculated from Scope 1 and Scope 2 only.

12. BBGI Public Company Limited Group has disclosed greenhouse gas account report covering the scope of operations in every business group. The verification results are verified and certified by Third-party in 2022. Therefore, 2022 is the base year.

ESG metrics	GRI STANDARD	List	Unit	2022	2023
EUT-E3.1	GRI 305-7	Releasing air pollution			
		Particulate matter from combustion (TSP)(a)	Metric tons/year	6.61	2.11
		Nitrogen oxide (from combustion) (NOx)(a)	Metric tons/year	58.25	54.27
		Sulfur dioxide (from combustion) (SOx)(a)	Metric tons/year	11.76	15.01
		Carbon monoxide (CO)(a)	Metric tons/year	60.77	35.72

Note

1. Waste management reporting scope of BBGI Public Company Limited Group 2023 covers company groups as follow:

1.1. BBGI Public Company Limited Head Office

1.2. BBGI Bioethanol Public Company Limited

1.3. BBGI Bioethanol (Chachoengsao) Company Limited

1.4. BBGI Biodiesel Company Limited

1.5. BBGI Utility and Power Company Limited (*began operating in 2023)

2. In 2022, BBGI Public Company Limited Group started to disclose waste management report according to GRI Universal Standards: GRI

3. Waste disposal method and quantity from the letter notifying the request results to remove waste or unused materials outside the

Contaminant type	Air contaminants amount from fuel combustion (biomass)
TSP (mg/m ³)	≤320(a)
SO ₂ (ppm)	≤60(a)
NO ₂ (ppm)	≤200(a)
CO (ppm)	≤690(a)

* Since 2022-2023, BBGI Public Company Limited Group has not released air pollutants exceeding the standard according to the announcement of the Ministry of Industry on determination of contaminant amount in the air released from the factory B.E. 2549

ESG metrics	GRI STANDARD	List	Unit	2020	2021	2022	2023
E4.2C	GRI 306-3 (HW+NHW)	Waste classified by type and management measure (* HW - hazardous waste, NHW - non-hazardous waste)					
		Total amount of waste generated ¹	Metric tons	2,282,477.90	2,309,425.95	1,804,543.14	1,246,574.63
		- Total amount of hazardous waste	Metric tons	205.81	338.19	594.46	43.64
		- Total amount of non-hazardous waste	Metric tons	2,282,272.09	2,309,087.76	1,803,948.68	1,246,530.99
		Proportion of waste that is not disposed by landfill % The amount of waste that is not disposed by landfill)	%	100.00%	100.00%	100.00%	100.00%
		- Reused and recycled waste (recycling, compost, animal feed)	%	91.07%	91.19%	88.76%	75.95%
		- Waste that is disposed by other measures - waste that is disposed by conversion back to fuel energy	%	8.74%	8.52%	10.95%	23.63%
		(alternative fuel/mixed fuel)	%	0.19%	0.29%	0.29%	0.42%
		- Waste that is disposed without reusing energy	%	0.00%	0.00%	0.00%	0.00%
		- Waste that is disposed by other disposal measures	%	0.00%	0.00%	0.00%	0.00%
		- Landfill	%	0.00%	0.00%	0.00%	0.00%
E4.4R	GRI 306-4	Waste that is managed (not by landfill)					
		Total amount of waste during management process (not by landfill)	Metric tons/year	2,278,171.83	2,302,808.83	1,799,307.07	1,241,363.59
		- Total amount of hazardous waste during management process that is not by landfill	Metric tons/year	13.84	1.12	102.61	0.42
		- Total amount of non-hazardous waste during management process that is not by landfill	Metric tons/year	2,278,157.99	2,302,807.71	1,799,204.46	1,241,363.17
		Total amount of hazardous waste during management process that is not by landfill - outside/inside establishment	Metric tons/year	13.84	1.12	102.61	0.42
		- Preparation for reuse	Metric tons	0.07	0.20	0.08	0.00
		- Recycling - outside establishment	Metric tons	13.77	0.92	102.53	0.42
		- Enter into the recovery process to reuse	Metric tons	0.00	0.00	0.00	0.00
		Total amount of hazardous waste during management process that is not by landfill - outside/inside establishment	Metric tons/year	2,278,157.99	2,302,807.71	1,799,204.46	1,241,363.17
		- Preparation for reuse	Metric tons	0.00	0.00	0.00	0.00
		- Recycling - outside establishment	Metric tons	6.82	41.95	65.84	14.67
		- made into fertilizer - inside establishment	Metric tons	2,069,337.62	2,105,784.98	1,583,941.07	946,090.13
		- animal feed - outside establishment	Metric tons	9,260.66	127.25	17,597.58	706.92
		- Enter into the recovery process to reuse (biological treatment) - outside establishment	Metric tons/year	199,552.89	196,853.53	197,599.97	294,551.45
GRI 306-5	GRI 306-5	Direct disposed waste					
		Total amount of direct disposed waste	Metric tons/year	4,306.07	6,617.12	5,236.07	5211.04
		- Total amount of direct disposed hazardous waste	Metric tons	191.97	337.07	491.85	43.22
		- Total amount of direct disposed non-hazardous waste	Metric tons	4,114.10	6,280.05	4,744.22	5167.82
		Total amount of direct disposed hazardous waste	Metric tons	191.97	337.07	491.85	43.22
		- * ^{DW} combustion (reusing energy: alternative fuel / mixed fuel) - outside establishment	Metric tons/year	144.24	337.07	490.39	42.49
		- Combustion (not reusing energy)	Metric tons/year	47.43	0.00	1.45	0.68
- Landfill	Metric tons	0.30	-	0.01	0.05		

ESG metrics	GRI STANDARD	List	Unit	2020	2021	2022	2023
	GRI 306-5	- Other disposal measures	Metric tons	0.00	0.00	0.00	0.00
		- Total amount of direct disposed non-hazardous waste	Metric tons/year	4,114.10	6,280.05	4,744.22	5167.82
		- outside / inside establishment					
		- * DIW combustion (reusing energy: alternative fuel / mixed fuel)	Metric tons/year	4111.13	6279.55	4744.16	5167.79
		- Combustion (not reusing energy)	Metric tons/year	0.00	0.00	0.06	0.03
		- landfill - outside establishment	Metric tons	2.97	0.50	0.00	0.00
		- Other disposal measures	Metric tons	0.00	0.00	0.00	0.00
	* Additional clarification on hazardous waste management						
	According to the announcement of the Department of Industrial Works (DIW), BBGI Public Company Limited Group has complied with the announcement of the Department of Industrial Works 2007, waste or unused materials management principles and procedures, B.E. 2550, B.E. 2551 and the Hazardous Substance Act B.E. 2535 and waste management has been classified and managed according to the announcement of the Ministry of Industry regarding the Hazardous Substance Act B.E. 2535 and waste or unused materials disposal, B.E. 2548. Waste management can be classified into 8 methods: Method 01 Segregation for resale, Method 02 Storing in containers, Method 03 Reusing, Method 04 Reusing for further use, Method 05 Recovery, Method 06 Treatment, Method 07 Disposal, and Method 08 Other management methods.						
	* DIW	Amount of direct disposed hazardous waste ^{/1}	Metric tons/year	-	-	-	0.00
	04	Recycling (disposal code 042,041 and 044)					
		- 041: Used as alternative fuel	Metric tons/year	0.00	0.00	0.00	0.00
		- 042: Used as mixed fuel	Metric tons/year	-	-	-	-
		- 044: as alternative raw material in cement kiln	Metric tons/year	0.00	0.00	0.00	0.00
	* DIW	Amount of direct disposed non-hazardous waste ^{/1}	Metric tons/year	0.00	0.00	0.00	0.00
	04	Recycling (disposal code 042,041 and 044)					
		- 041: Used as alternative fuel	Metric tons/year	0.00	0.00	0.00	0.00
		- 042: Used as mixed fuel	Metric tons/year	0.00	0.00	0.00	0.00
		- 044: as alternative raw material in cement kiln	Metric tons/year	0.00	0.00	0.00	0.00

Remark

1. Waste management reporting scope of BBGI Public Company Limited Group 2023 covers company groups as follow:

- 1.1. BBGI Public Company Limited Head Office
- 1.2. BBGI Bioethanol Public Company Limited
- 1.3. BBGI Bioethanol (Chachoengsao) Company Limited
- 1.4. BBGI Biodiesel Company Limited
- 1.5. BBGI Utility and Power Company Limited (*began operating in 2023)

2. In 2022, BBGI Public Company Limited Group started to disclose waste management report according to GRI Universal Standards: GRI 306, version 2020 such as GRI306-3 GRI306-4 and GRI306-5. Previous data from 2020 - 2023 has been reclassified to report in accordance with GRI 306, version 2020. Data from 2020 - 2023 that do not have a database according to the new criteria will be replaced with N/A.

3. Waste disposal method and quantity from the letter notifying the request results to remove waste or unused materials outside the factory area. Department of Industrial Works and waste transportation document.